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Prof. G. B. M. Zerr has been elected Principal of the East Chester High School. Professor Zerr will now be located only a few miles from the University of Pennsylvania, to whose mathematical library he will have access, and of which he will make good use.

BOOKS AND PERIODICALS.

Elements of Trigonometry with Tables. By Herbert C. Whitaker, Ph. D. (University of Pennsylvania), Central Manual Training School, Philadelphia, Penn. 8vo Cloth, xvi + 182 pages. Price, \$1.00. Philadelphia: D. Anson Partridge.

Among the many noteworthy features of this book are: The concise and accurate statement of definitions; a table of Circular Measure, i. e., where degrees and minutes are reduced to radians; clear presentation of fundamental conventions; a brief but comprehensive discussion of the Theory of Logarithms; and an excellent introduction to the study of Complex Quantities and Hyperbolic Functions. The discussion of the Theory of Logarithms and the setting forth of the method by which Napier invented his system will be of great value to all students of Trigonometry and Algebra. The work, in every way, is worthy of the highest patronage by teachers who are contemplating a change of textbooks on this subject.

B. F. F.

Prismoidal Formulæ and Earthwork. By Thomas U. Taylor, C. E. (University of Virginia), M. C. E. (Cornell University), Associate Member of the American Society of Civil Engineers; Member of the American Mathematical Society; Professor of Applied Mathematics, University of Texas. First edition, first thousand. 8vo Cloth, x + 102 pages. Price, \$1.50. New York: John Wiley & Sons.

The object of this admirable treatise on *Prismoidal Formulæ and Earthwork* is to present a ready method of estimating the usual quantities in earthwork computations by graphical methods. The method outlined by the author applies to the majority of earthwork calculations, whether the volume be calculated by the Newtonian or average end-area formula. In this respect the work will be of great value to the civil engineer. The author, in writing the book, has also discovered the original authors of the usual formulæ associated with the prismatoid and ascribes the honor to Newton, Hirsch, Koppe and Kinklin as can be verified by history. The introduction to the work is of great historic interest and value.

B, F. F.

Lectures on the Geometry of Position. By Theodore Reye, Professor of Mathematics in the University of Strassburg. Translated and Edited by Thom-F. Holgate, M. A., Ph. D., Professor of Applied Mathematics in Northwestern University. Part I. 8vo Cloth, xix + 248 pages. Price, \$2.25, *net*. New York: The Macmillan Co.

It is believed that Professor Reye's work, *Geometrie der Lage*, is the best in any language. In translating the first part of this incomparable work into English, the translator has placed within easy reach of the English-speaking student the most refined discus-

sion of pure geometry extant. There is scarcely another field in mathematics at once so interesting and so fruitful of discovery and yet lacking much of the abstruseness characterizing other modern mathematical subjects as is Projective Geometry, or Geometry of Position. Notwithstanding the fact that the subject is the most stimulating branch of mathematics and admits of various beautiful and convenient applications to technical and natural sciences, yet it has not thus far received the attention of teachers of mathematics it so richly deserves. It is to be hoped that this very excellent translation by Dr. Holgate will be the means of introducing the subject in the course of mathematics in every college in this country. The translation, in general, is rather liberal than literal, thus presenting in good, readable English, without destroying the charm of the original writing, the geometric ideas contained in the text.

Some very decided improvements over the original have been made, viz., The articles have been numbered; the examples set at the end of the lectures to which they are related and a few new ones added; explanatory notes have been inserted where they seemed necessary or helpful, and an index has been compiled.

The following is the table of contents:

Lecture I—The Methods of Projection and Section—The Six Primitive Forms of Modern Geometry: Lecture II—Infinitely Distant Elements—Correlation of the Primitive Forms to one another. In this lecture are set down the conventions, interpretations or assumptions respecting the "point infinity," "the line infinity." As there has been, in the past, quite a good deal said in the *Monthly* about the fallacious argument introduced in modern mathematics it will be well for those who wish to gain thorough knowledge of the modern notions of "the point infinity" and the line infinity to read carefully this second lecture of Reye.

From the following, one of a number of considerations, we assume that every straight line has one point and only one point at infinity:

Let AB be a straight line. Take C anywhere between A and B . Also consider the



directions AB positive and BC negative. Then AC/CB is positive for all positions between A and B . When C is at A , AC/CB is 0; when C is at B , AC/CB is ∞ . When $AC=CB$, $AC/CB=1$, and AB is bisected internally at C . When C is at the right of B , AC/CB is negative, and when C is at an infinite distance from B , AC/CB is -1 . When C is to the left of A , AC/CB is negative, and when C is at an infinite distance from A , AC/CB is -1 . Since in going in both directions, an infinite distance from A , we get the same quotient, -1 , we conclude there is just one such point of bisection [corresponding to the internal point of bisection C when C is to the right of A and to the left of B], or the point of infinity. This forces us to assume that the straight line is a continuous or closed line, its extremities meeting in the point infinity.

The ancients had no use for the above notions and so did not insert them in their mathematics. Whether or not the physical properties of a straight line agree with the above notions can neither be proved or disproved. The ancients said, two straight lines are parallel when they have no point in common, however far they be produced. The moderns say: Two lines are parallel when they have only one point in common, viz., the point at infinity. The modern conception of parallelism has distinct advantages over the ancient one, in that "first, many theorems can be enunciated in a perfectly general way for which otherwise exceptions would always have to be cited, and second, many apparently difficult theorems can, in accordance with this view, be comprised in a single statement."

All the infinite points of a plane lie on a straight line, viz., the line at infinity; since it is intersected by every line of the plane in only one point, the point infinity. A curved line may have, in common with a straight line, more than one point.

Two parallel planes have only one line in common, viz., the line infinity.

All infinity points and lines in space lie in a plane, viz., the plane at infinity; since it is intersected by every straight line in only one point and by every plane in a straight line.

To see to what great advantage these principles are turned, one needs to read carefully the whole of Reye's great work.

Lecture III.—The Principles of Reciprocity or Duality—Simple and Complete n -Points, n -Sides, n -Edges, etc.

Lecture IV.—Correlation of Complete n -Points, n -Sides, and n -Edges to one another—Harmonic Forms—Examples; Lecture V.—Projective Properties of One-Dimensional Primitive Forms—Examples; Lecture VI.—Curves, Sheaves and Cones of the Second Order—Examples; Lecture VII.—Deductions from Pascal's and Brianchon's Theorems—Examples; Lecture VIII.—Pole and Polar with respect to Curves of the Second Order; Lecture IX.—Diameters and Axes of Curves of the Second Order—Algebraic Equations of these Curves—Examples; Lecture X.—Regular and Ruled Surfaces of the Second Order—Examples; Lecture XI.—Projective Properties of Elementary Forms—Examples; Lecture XII.—Involution—Examples; Lecture XIII.—Metric Relations of Involution—Foci of Curves of the Second Order—Examples; Lecture XIV.—Problems of the Second Order Imaginary Elements—Examples; Lecture XV.—Principal Axes and Planes of Symmetry—Focal Axes and Cyclic Planes of a Cone of the Second Order—Examples; Appendix.—Principal of Reciprocal Radii—Ruled Surfaces of the Third Order—Quadrangles and Quadrilaterals which are Self-Polar with respect to Conic Sections—Nets and Webs of Conic Sections; Index.

B. F. F.

Collier's Weekly. An Illustrated Journal of Art, Literature, and Current Events. Special price to close of year, \$1.00. 521-549 West Thirteenth Street, New York City.

In view of the widespread interest in the present war, *Collier's Weekly* is especially popular. Its correspondents with the army and navy furnish most interesting letters each week, while the war pictures, in the illustrated bulletin of the week's news from the front, are unsurpassed.

J. M. C.